INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND CREATIVE ENGINEERING

IJITCE (ISSN: 2045-8711) VOL.15 NO.02 FEB 2025

IJITCE PUBLICATION

www.ijitce.co.uk

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IJITCE PUBLICATION

International Journal of Innovative Technology and Creative Engineering

IJITCE (ISSN:2045-8711)

Vol.15 No.02 FEB 2025

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From The Editorial Board

Dear Researcher,
Greetings!

Articles in this issue discusses about

Abandonware - Legal, Ethical, and Cybersecurity Implications

Countering Akira Ransomware: Detection, Containment, and Recovery through a Layered Strategy

We look forward many more new technologies in the next month.

Thanks,
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Abandonware - Legal, Ethical, and Cybersecurity Implications

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Abstract

Abandonware refers to software that is no longer maintained, supported, or distributed by its original developers or publishers. This phenomenon raises critical discussions across legal, ethical, and cybersecurity domains. While some consider abandonware a cultural artifact that should be preserved for historical and educational purposes, others view its redistribution as a potential copyright infringement. The legal ambiguity surrounding abandonware is compounded by varying intellectual property laws across jurisdictions. Additionally, abandoned software poses cybersecurity risks, as vulnerabilities remain unpatched, making it a potential vector for exploitation. This paper explores the history, legality, preservation efforts, and security risks associated with abandonware, emphasizing the need for balanced policies that promote digital preservation while mitigating risks related to intellectual property violations and cybersecurity threats.

Introduction

Abandonware is a term used to describe software that has been discontinued, is no longer supported by its developers, or has been forgotten by its publishers. While these programs may still hold historical, educational, or even practical value, they exist in a legal and ethical gray area. Unlike open-source software, abandonware is not officially released for free use, yet it often circulates on the internet, raising concerns over copyright law, digital preservation, and cybersecurity risks.

The rapid pace of technological advancement has rendered many older software applications obsolete. Companies that once developed and supported these programs may have gone out of business, lost interest in maintaining them, or transitioned to newer products, leaving behind software that is still functional but legally inaccessible. Despite this, digital archivists, enthusiasts, and historians argue for the preservation of abandonware as part of technological heritage, enabling future generations to study, understand, and use legacy systems.

However, abandonware is not without risks. Security vulnerabilities in outdated software remain unpatched, making them potential attack vectors for cybercriminals.Additionally, unauthorized redistribution of abandonware raises intellectual property concerns, as ownership rights may still be enforced despite the software being neglected. The legal landscape surrounding abandonware remains complex, with different jurisdictions offering varied interpretations of copyright expiration, fair use, and software licensing.

This paper explores the concept of abandonware from multiple perspectives, including its historical significance, legal and ethical dilemmas, preservation efforts, and cybersecurity implications. By analyzing these aspects, we aim to provide a comprehensive understanding of how abandonware fits within the broader digital ecosystem and what measures can be taken to balance preservation with legal and security considerations.

Background of the study

The goal of study of Abandon-wares and copyright project is to assess the Intellectual Property issues associated

with Abandon-wares and to find legal, economic and social impacts on such residual abandon-wares.

Hypothesis

It is hypothesized that the Abandonware are untouched grey area of software industries where the abandoned softwares been used as alternative, extended, supportive part of currently available commercial softwares .

Review of Literature:

- http://wtvpc.com/is-abandonware-legal/
- http://softwareengineering.stackexchange.com/questions/263570/software-licensing-of-free-abandonware
- https://news.slashdot.org/story/00/08/10/1219212/abandonware-and-copyright-laws
- http://lowendmac.com/2001/abandonware-and-copyright/
- http://www.makeuseof.com/tag/what-is-abandonware-and-is-it-legal/
- http://www.myabandonware.com
- https://wustl.edu/about/compliance-policies/computers-internet-policies/legal-ethical-software-use/
- http://whatis.techtarget.com/definition/abandonware
- https://blog.nus.edu.sg/greyarea/2013/04/14/abandonware/
- https://www.cnet.com/forums/discussions/will-xp-be-considered-abandonware-after-april-2014

Objective of the Study

The goal of study of Abandon-ware and the copyright project is to assess the Intellectual Property issues associate with Abandon-ware and to find legal, economic and social impacts associated with abandon-wares.

The abandon wares inherently possess the legal tags associated with the Intellectual property. The reuse or exploitation of such abandonwares needs clarification over legal issues.

The innovation, commercial benefits associated with the abandonware. The original Intellectual property rights over the abandon-ware.

The licensing, Terms and condition with timeline of abandon ware.

Abandonware

Abandon-ware is a product, typically software, ignored by its owner and manufacturer, and for which no product support is available. Although such software is usually still under copyright, the owner may not be tracking or enforcing copyright violations.

Definition

Definitions of "abandoned" vary, but in general it is like any item that is

abandoned – it is ignored by the owner, and as such product support and possibly copyright enforcement are also "abandoned". It can refer to a product that is no longer available for legal purchase, over the age where the product creator feels an obligation to continue to support it, or where operating systems or hardware platforms have evolved to such a degree that the creator feels continued support cannot be financially justified. In such cases, copyright and support issues are often ignored. Software might also be considered abandoned when it can be used only with obsolete technologies, such as pre-Macintosh Apple computers. A difference between abandonware and a discontinued product is that the manufacturer has not issued an official notice of discontinuance; instead, the manufacturer is simply ignoring the product.

Abandonware may be computer software or physical devices which are usually computerised in some fashion, such as personal computer games, productivity applications, utility software, or mobile phones.

Commercial software unsupported but still owned by a viable company

The availability of the software depends on the company's attitude toward the software. In many cases, the company which owns the software rights may not be that which originated it, or may not recognize their ownership. Some companies, such as Borland, make some software available online, in a form of freeware. Others do not make old versions available for free use and do not permit people to copy the software. Many Abandonware websites have been set up to archive and make available copies of unsupported and discontinued operating systems made by Microsoft and Apple, as well as rare development builds of such operating systems that have been leaked by the media or technicians working for said companies - the latter is popular among retrogaming and computing enthusiasts, who value the availability of these operating systems for the ease of access they provide. After Windows XP support was discontinued in April 2014, numerous websites started providing the operating system for free. The operating system's usage and popularity thus prevented it from being entirely abandoned.

Commercial software owned by a company no longer in business

When no owning entity of a software exist, all activities (support, distribution, IP activities etc.) in relationship to this software have ceased. If the rights to a software are non-recoverable in legal limbo ("orphaned work"), also the software's rights can't be bought by another company, there can't be copyright enforcement etc. An example of this is Digital Research's original PL/I compiler for DOS, which was considered for many years without owner (now probably owned by Novell).

Shareware whose author still makes it available

Finding historical versions, however, can be difficult since most shareware archives remove past versions with the release of new versions. Authors may or may not make older releases available. Some websites collect and offer for download old versions of shareware, freeware, and (in some cases) commercial applications. In some cases these sites had to remove past versions of software, particularly if the company producing that software still maintains it, or if later software releases introduce digital rights management, whereby old versions could be viewed as DRM circumvention.

Unsupported or unmaintained shareware /Open source and freeware programs that have been abandoned:

In some cases, source code remains available, which can prove a historical artifact. One such case is PC-LISP, still found online, which implements the Franz Lisp dialect. The DOS-based PC-LISP still runs well within emulators and on Microsoft Windows.

Copyright

Copyright is a legal right created by the law of a country that grants the creator of an original work exclusive rights for its use and distribution. This is usually only for a limited time. The exclusive rights are not absolute but limited by limitations and exceptions to copyright law, including fair use. A major limitation on copyright is that copyright protects only the original expression of ideas, and not the underlying ideas themselves.

Copyright is a form of intellectual property, applicable to certain forms of creative work. Some, but not all jurisdictions require "fixing" copyrighted works in a tangible form. It is often shared among multiple authors, each of whom holds a set of rights to use or

license the work, and who are commonly referred to as rights holders.

These rights frequently include reproduction, control over derivative works, distribution, public performance, and "moral rights" such as attribution. Copyrights are considered *territorial rights*, which means that they do not extend beyond the territory of a specific jurisdiction. While many aspects of national copyright laws have been standardized through international copyright agreements, copyright laws vary by country.

Typically, the duration of a copyright spans the author's life plus 50 to 100 years (that is, copyright typically expires 50 to 100 years after the author dies, depending on the jurisdiction). Some countries require certain copyright formalities to establishing copyright, but most recognize copyright in any completed work, without formal registration. Generally, copyright is enforced as a civil matter, though some jurisdictions do apply criminal sanctions. Most jurisdictions recognize copyright limitations, allowing "fair" exceptions to the creator's exclusivity of copyright and giving users certain rights.

The development of digital media and computer network technologies have prompted reinterpretation of these exceptions, introduced new difficulties in enforcing copyright, and inspired additional challenges to copyright law's philosophic basis. Simultaneously, businesses with great economic dependence upon copyright, such as those in the music business, have advocated the extension and expansion of copyright and sought additional legal and technological enforcement.

Ownership:

original holder of the copyright may be the employer of the author rather than the author himself, if the work is a "work for hire".For example,in English law the *Copyright, Designs and Patents Act* 1988 provides that if a copyrighted work is made by an employee in the course of that employment, the copyright is automatically owned by the employer which would be a "Work for Hire."

Eligible works

Copyright may apply to a wide range of creative, intellectual, or artistic forms, or "works". Specifics vary by jurisdiction, but these can include poems, theses, plays and other literary works, motion pictures, choreography, musical compositions, sound recordings, paintings, drawings, sculptures, photographs, computer software, radio and television broadcasts, and industrial designs. Graphic designs and industrial designs may have separate

or overlapping laws applied to them in some jurisdictions.

Copyright does not cover ideas and information themselves, only the form or manner in which they are expressed. For example, the copyright to a Mickey Mouse cartoon restricts others from making copies of the cartoon or creating derivative works based on Disney's particular anthropomorphic mouse, but does not prohibit the creation of other works about anthropomorphic mice in general, so long as they are different enough to not be judged copies of Disney's. Note additionally that Mickey Mouse is not copyrighted because characters cannot be copyrighted; rather, Steamboat Willie is copyrighted and Mickey Mouse, as a character in that copyrighted work, is afforded protection.

Originality

Typically, a work must meet minimal standards of originality in order to qualify for copyright, and the copyright expires after a set period of time (some jurisdictions may allow this to be extended). Different countries impose different tests, although generally the requirements are low in the United

Kingdom there has to be some "skill, labour, and judgment" that has gone into it. In Australia and the United Kingdom it has been held that a single word is insufficient to comprise a copyright work. However, single words or a short string of words can sometimes be registered as a trademark instead.

Copyright law recognizes the right of an author based on whether the work actually is an original creation, rather than based on whether it is unique two authors may own copyright on two substantially identical works, if it is determined that the duplication was coincidental, and neither was copied from the other.

Registration

In all countries where the Berne Convention standards apply, copyright is automatic, and need not be obtained through official registration with any government office. Once an idea has been reduced to tangible form, for example by securing it in a fixed medium (such as a drawing, sheet music, photograph, a videotape, or a computer file), the copyright holder is entitled to enforce his or her exclusive rights. However, while registration isn't needed to exercise copyright, in jurisdictions where the laws provide for registration, it serves as *prima facie* evidence of a valid copyright and enables the copyright holder to seek statutory damages and attorney's fees.(In the USA, registering after an infringement

only enables one to receive actual damages and lost profits.)

Software copyright

Software copyright is the extension of copyright law to machine-readable software. While many of the legal principles and policy debates concerning software copyright have close parallels in other domains of copyright law, there are a number of distinctive issues that arise with software. This article will primarily focus on topics peculiar to software.

Software copyright is used by Software Developers and proprietary software companies to prevent the unauthorized copying of their software. Free and open source licenses also rely on copyright law to enforce their terms. For instance, copy left licenses impose a duty on licensees to share their modifications to the work with the user or copy owner under some circumstances. No such duty would apply had the software in question been in the public domain.

Fair use

Fair use is a defense to an allegation of copyright infringement under section 107 of the Copyright Act of 1976. This section describes some of the uses of copyrighted software that courts have held to be fair. In Galoob v. Nintendo, the 9th Circuit held that modification of copyright software for personal use was fair. In Sega v. Accolade, the 9th Circuit held that making copies in the course of reverse engineering is a fair use, when it is the only way to get access to the "ideas and functional elements" in the copyrighted code, and when "there is a legitimate reason for seeking such access".

Global Facts on Software Copyright:

Canada

In Canada software is protected as a literary work under the Copyright Act of Canada. Copyright is acquired automatically when an original work is generated, the creator is not required to register or mark the work with the copyright symbol in order to be protected. The rights holder is granted: the exclusive right of reproduction, the right to rent the software, the right to restrain others from renting the software and the right to assign or license the copyright to others. Exceptions to these rights are set out by the terms of Fair Dealing, these exempt users from copyright liability covering usage and reproduction when performed for research, private study, education, parody or satire. Changes to the Copyright Act in regard to digital copyright were debated in the Canadian

Parliament in 2008. Bill C-61 proposed alterations of the breadth and depth of exemptions for uses such as personal back-ups, reverse engineering and security testing.

India

Software is copyrightable in India. Copyright in software, in the absence of any agreement to the contrary, vests in the author of the software, even for commissioned works. Copyright can be assigned or licensed through a written document, but under the Indian Copyright Act, in case the period of assignment is not specified, the period is deemed to be 5 years from the date of assignment (section 19(5) of the Copyright Act). In a recent judgement in the case of Pine Labs Private Limited vs Gemalto Terminals India Private Limited the Delhi High Court has laid down that the copyright belongs to the author (in this case, Pine Labs) and as the period of assignment was not specified in the document of assignment (the Master Service Agreement), the copyright in the software reverted to Pine Labs after 5 years. See Assignment of Copyright in Software.

United States

Copyright protection attaches to "original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."17 U.S.C.A. § 102. Copyright functions by granting the author the right to exclude others. Copyright protects:

literary works, musical works (& accompanying words),dramatic works (& accompanying music), pantomimes and choreographed works, pictorial, graphic, & sculptural works, motion pictures & other audiovisual works, sound recordings, architectural works, compilations and derivative works – 17 USC § 103(a).

In the United States, computer programs are literary works, under the definition in the Copyright Act, 17 U.S.C. § 101.

There is a certain amount of work that goes into making copyright successful and just as with other works, copyright for computer programs prohibits not only literal copying, but also copying of "non-literal elements", such as program's structure, sequence and organization. These non-literal aspects, however, can be protected only "to the extent that they

incorporate authorship in programmer's expression of original ideas, as distinguished from the ideas themselves". In Computer Associates vs Altai, the Second Circuit proposed the Abstraction-Filtration-Comparison test for identifying these protected elements. This test attempts to distinguish copyrightable aspects of a program from the purely utilitarian and the public domain.

Copyright attaches only to original works. A work is “created” when it is fixed in a “tangible medium of expression” for the first time. 17 U.S.C. § 101. Circuits differ on what it means for a work to be fixed for the purposes of copyright law and infringement analysis. The graphics, sounds, and appearance of a computer program also may be protected as an audiovisual work; as a result, a program can infringe even if no code was copied [25]. The set of operations available through the interface is not copyrightable in the United States under Lotus v. Borland, but it can be protected with a utility patent. The law is unclear as to whether transient copies – such as those cached when transmitting digital content, or temporary copies in a computer’s RAM – are “fixed” for the purposes of copyright law. The Ninth Circuit has held that “A derivative work must be fixed to be protected under the Act, but not to infringe”. In Apple v. Microsoft, the courts established that a look and feel copyright claim must demonstrate that specific elements of a user interface infringe on another work. A program's particular combination of user interface elements is not copyrightable.

Concept of Copyright Societies:

Collective administration of copyright by societies is a concept where management and protection of copyright in works are undertaken by a society of authors and other owners of such works. No authors and other owner of copyright in any work can keep track of all the uses others make of his work. When he becomes a member of a national copyright society, that society, because of its organisational facilities and strength, is able to keep a better vigil over the uses made of that work throughout the country and collect due royalties from the users of those works. Because of the country’s membership in international conventions, the copyright societies are able to have reciprocal agreements with similar societies in other countries for collecting royalties for the uses of Indian works in those countries. Therefore, it is in the interests of copyright owners to join a collective administration organisation to

ensure better protection to the copyright in their works and for reaping optimum economic benefits from their creations. Users of different types of works also find it easy to obtain licences for legal exploitation of the works in question, though the collective administrative society.

Copyright societies in India:

A copyright society is a registered collective administration society under Section 33 of the Copyright Act, 1957. Such a society is formed by authors and other owners. The minimum membership required for registration of a society is seven. Ordinarily, only one society is registered to do business in respect of the same class of work. A copyright society can issue or grant licences in respect of any work in which copyright subsists or in respect of any other right given by the Copyright Act.

The business of issuing or granting license in respect of literary, dramatic, musical and artistic works incorporated in a cinematograph films or sound recordings shall be carried out only through a copyright society duly registered under this Act. This is a kind of compulsory collective licensing for managing of performing rights.

The registration granted to a copyright society shall be for a period of five years and may be renewed from time to time before the end of every five years on a request in the prescribed form and the Central Government may renew the registration after considering the report of Registrar of Copyrights on the working of the copyright society under section 36.

The renewal of the registration of a copyright society shall be subject to the continued collective control of the copyright society being shared with the authors of works in their capacity as owners of copyright or of the right to receive royalty. Every copyright society already registered before the Copyright (Amendment) Act, 2012 came into existence shall get itself registered under this Chapter within a period of one year from the date of commencement of the Copyright (Amendment) Act, 2012.

Functions of a copyright society

Conditions subject to which a copyright society may issue licences, collect fees and distribute such fees.

(1) A copyright society may issue licences and collect fees in accordance with its Scheme of Tariff in relation to only such works as it has been authorised to administer in writing by the authors and other owners of rights and for the period for which it has been so authorised.

(2) The distribution of fees collected shall be subject to a deduction not exceeding

fifteen per cent of the collection on account of administrative expenses incurred by the copyright society.

Administration of rights of owner by copyright society (*Section 34 of Copyright Act,1957*)

(1) (a) a copyright society may accept from an author and other owner of rights exclusive authorisation to administer any right in any work by issue of licences or collection of licence fees or both; and

(b) an author and other owner of rights shall have the right to withdraw such authorisation without prejudice to the rights of the copyright society under any contract.

(2) It shall be competent for a copyright society to enter into agreement with any foreign society or organisation administering rights corresponding to rights under this Act, to entrust to such foreign society or organisation the administration in any foreign country of rights administered by the said copyright society in India, or for administering in India the rights administered in a foreign country by such foreign society or organisation:

Provided that no such society or organisation shall permit any discrimination in regard to the terms of licence or the distribution of fees collected between rights in Indian and other works.

(3) Subject to such conditions as may be prescribed, a copyright society may-

(i) issue licences under section 30 in respect of any rights under this Act;

(ii) collect fees in pursuance of such licences;

(iii) distribute such fees among author and other owners of rights after making deductions for its own expenses;

(iv) perform any other functions consistent which the provisions of section 35.

Control over the copyright society by the authors and other owner of rights.- (*Section 35 of Copyright Act,1957*)

(1) Every copyright society shall be subject to the collective control of the author and other owners of rights under this Act whose rights it administers (not being author and other owners of rights under this Act administered by a foreign society or organisation referred to in sub-section (2) of section (34) and shall, in such manner as may be prescribed,-

(a) obtain the approval of such owners of rights for its procedures of collection and distribution of fees;

(b) obtain their approval for the utilisation of any amounts

collected as fees for any purpose other than distribution to the owner of rights; and

(c) provide to such owners regular, full and detailed information concerning all its activities, in relation to the administration of their rights.

(2) All fees distributed among the owners of rights shall, as far as may be, be distributed in proportion to the actual use of their works.

(3) Every copyright society shall have a governing body with such number of persons elected from among the members of the society consisting of equal number of authors and owners of wmx for the purpose of the administration of the society as may be specified.

(*4)* All members of copyrights society shall enjoy equal membership rights and there shall be no discrimination between authors and owners of rights in the distribution of royalties.

Records to be maintained by copyright societies

Every copyright society shall maintain the following registers at its registered or administrative office**:**

(*i*) a register of authors and other owners to be called the "Register of Authors and Other Owners" in respect of right or set of rights in the specific categories of works for which the copyright society has been authorised to issue or grant licences. The register shall contain the names of the authors and other owners, their addresses, the nature of rights authorised to be administered by the copyright society, year of publication of the work, the date on which the copyright society becomes entitled to issue or grant licences and the duration of such entitlement, the territory for which the authorization has been given and the rights that have been so authorised;

(*ii*) a register to be called the "Register of Agreements" containing a copy of every agreement entered into by the copyright society with the authors and other owners for the purpose;

(*iii*) a register to be called the "Register of Royalties" containing particulars of royalties and mentioning the names of persons or organisations and copy of the licence agreements from whom the royalties have been realised, and the amount so realised including the date of realisation;

(*iv*) a register to be called the "Disbursement Register" containing details of disbursement of royalties made to each author or other owner of right or set of rights in the specific categories of

works, category-wise, mentioning the name of the author or other owner, nature of his right and the date and amount of disbursement of royalty made to him.

Tariff Scheme by copyright societies.

Every copyright society shall publish its tariff scheme in such manner as prescribed in the Copyright Rules, 2013. Any person who is aggrieved by the tariff scheme may appeal to the Copyright Board and the Board may, if satisfied after holding such inquiry as it may consider necessary, make such orders as may be required to remove any unreasonable element, anomaly or inconsistency therein. The aggrieved person shall pay to the copyright society any fee as may be prescribed that has fallen due before making an appeal to the Copyright Board and shall continue to pay such fee until the appeal is decided, and the Board shall not issue any order staying the collection of such fee pending disposal of the appeal. The Copyright Board may after hearing the parties fix an interim tariff and direct the aggrieved parties to make the payment accordingly pending disposal of the appeal.

Distribution Scheme

(1) A copyright society shall frame a scheme to be called the "Distribution Scheme" setting out the procedure for distribution of royalties specified in the Tariff Scheme among the members whose names are entered in the Register of Authors and Owners maintained under clause (i) of rule 59 for the approval of the General Body of the society, as soon as may be, but in no case later than three months from the date on which a copyright society has become entitled to commence its copyright business.

(2) The distribution shall, reasonably, be in proportion to the royalty income of the copyright society derived from the grant of licences for right or set of rights in the specific categories of works for which it is administering each author and other owners of right.

(3) There shall be no discrimination between authors and other owners of rights in the distribution of royalties by the copyright society.

(4) While distributing the royalties the copyright society shall inform all members about the basis on which such amount of royalties are being distributed.

(5) The Distribution Scheme shall aim to ensure that all royalty distributions are fair, accurate, cost effective and without any unknown or hidden cross-subsidies.

(6) The society shall fix parameters in a transparent manner for determining the share of distribution of its members and reveal the details of the same in a manner

that is easily understandable to its members.

(7) The distribution of royalties shall be based on actual use or reliable statistical data that fairly represent the commercial exploitation of the licensed rights.

(8) The Distribution Scheme shall ensure that the royalties to all members are distributed at least once in a quarter.

(9) The copyright society shall not make any payment in the nature of minimum guarantee to its members against the share of royalties due to its members.

(10) The royalties collected based on the Tariff Scheme for the licensing of the rights in the literary or musical works included in a cinematograph film or sound recording shall be shared on an equal basis with the authors of literary or musical works and the owners of rights in cinematograph film or sound recording under sub-section (1) of section 18.

Meeting of a copyright societies.

(1) Every copyright society shall hold a General Body meeting of all its members as its annual General Body meeting before the 31st day of March every year.

(2) A special meeting of the General Body called extra ordinary General Body meeting of all its members may also be held, if considered necessary, by two thirds majority of the Governing Council.

(3) The meetings of General Body and Governing Council shall be held in the town or city in which its registered office is situated or such other convenient place as decided by the Chairman of the society.

(4) The notice for General Body meeting shall be issued before twenty-one days of the meeting and it shall and specify the agenda, time, date and address of the venue of the meeting and the same shall be posted on the website of the society.

(5) Every member of the society shall have equal voting rights in the General Body meetings.

(6) There shall be no discrimination between members who are authors and other owners of right.

(7) Quorum for meetings of the General Body shall be one third of the total members and in case of lack of quorum the meeting may be adjourned for thirty minutes and then members present shall constitute quorum.

(8) Quorum for the meetings of the Governing Council shall be one third of its total members other than the Chairman with equal number of authors and other owners.

(9) The Registrar of Copyrights shall be invited as an observer to all General Body meetings. The Registrar or his authorised representative on his behalf may attend the said meeting.

Documents to be presented in the annual general meeting of owners of rights.

Every copyright society shall place before its annual General Body meeting the following documents, namely:

(i) an up-to-date list of the authors and other owners of right or the set of rights in the specific categories of works for which the copyright society has been authorised to issue or grant licences, their names and addresses as recorded in the Register of Authors and Owners maintained by the copyright society, as provided in sub-rule (i) of rule 64;

(ii) audited accounts of the society for the previous year;

(iii) the Tariff Scheme and the Distribution Scheme or any other scheme including the decision of the Copyright Board on the said Schemes, if any;

(iv) annual report as approved by the Governing Council, giving full and detailed account of all its activities during the previous years;

(v) Budget estimates along with programme of action as approved by the Governing Council for the succeeding year;

(vi) the agreements, if any entered with foreign copyright societies under sub-section (2) section 34 of the Act;

(vii) any changes made in the instrument of registration of the society; and

(viii) any other document relating to the society that require approval of the General Body.

Returns to be filed by the copyright societies with the Registrar of Copyrights.

Every copyright society shall file a return called the Annual Return with the Registrar of Copyrights within one month from the date of conclusion of each annual General Body meeting setting out the following details, namely :

(*i*) the date of the annual General Body meeting held immediately preceding the filing of the annual return, the number of members who attended the meeting, agenda and the minutes of such meeting ;

(*ii*) the up-to-date list of the members, their names and addresses as recorded in the Register of Authors and Owners maintained by the copyright society, as provided in rule 64;

(*iii*) audited accounts of the copyright society;

(*iv*) the Tariff Scheme, Distribution Scheme and other Schemes, if any;

(v) annual report approved by the General Body giving full and detailed account of all its activities during the year;

(vi) the list of the members to whom royalties are not distributed and the reasons for the same; and

(vii) the list of the members to whom royalties have been distributed together with the amounts so distributed.

Code of Conduct for copyright societies

Every copyright society shall conform to the following Code of Conduct as follows:-

(1)Every Society shall make available on its website;

(a) certificate of registration as a Copyright Society;

(b) basic documents of governance such as memorandum of association, articles of association, constitution or charter;

(c) list of all members of General Body;

(d) names and address of Chairman, other members of the Governing Council and other officers of the society;

(e) right or set of rights in the specific categories of works for which the copyright society has been authorised to issue or grant licences;

(f) all schemes of the society;

(g) annual report and audited accounts as approved by the General Body;

(h) licence agreement formats;

(i) details of all existing licences other than those clauses in the licence having commercial sensitivity;

(j) foreign societies with whom there are agreements to collect royalties and the details of the agreement other than those clauses having commercial sensitivity;

(k) details of the complaint or Grievances Cell; and

(I) the code of conduct.

(2)The members shall be-

(a) treated fairly, honestly, impartially, courteously, and ensure that its dealings with them are more transparent;

Are individual rights owners are entitled to issue licences and collect royalties who are not members of any copyright society?

As per Section 30 of the Copyright Act, 1957, the owner of the copyright in any existing work or the prospective owner of the copyright in any future work may grant any interest in the right by licence in writing signed by him or by his duly authorised agent. Therefore, apart from copyright societies any individual rights owners (e.g. Super Cassette Industries/ Yash Raj Music/ Big Music etc.,) are

entitled to issue licences and collect royalties. However, the business of issuing or granting license in respect of literary, dramatic, musical and artistic works incorporated in a cinematograph films or sound recordings shall he carried out only through a copyright society duly registered under this Act. This is a kind of compulsory collective licensing for managing of performing rights. Any non-membership in IPRS or individually issuing performing right licences by any music company is illegal as per the Act.

As per Section 52 (a) of the Copyright Act, 1957, copyright in a work shall be deemed to be infringed, when any person, without a licence granted by the owner of the copyright or the Registrar of Copyrights under this Act or in contravention of the conditions of a licence so granted or of any condition imposed by a competent authority under the Act.

Performers' Society

Registration and management of Performers' Society. — (1) For the purpose of carrying on the business of issuing or granting licences in respect of performer's rights under sub-section (1) and proviso to sub-section (2) of section 38A and section 39A , there shall be a separate performers' society for each class of performers such as actors, singers, musicians, dancers, acrobats, jugglers, conjurers, snake charmers, persons delivering lectures or any other group of persons who can make a performance.

End-user license agreement:

In proprietary software, an end-user license agreement (EULA) or software license agreement is the contract between the licensor and purchaser, establishing the purchaser's right to use the software. The license may define ways under which the copy can be used, in addition to the automatic rights of the buyer including the first sale doctrine and 17 U.S.C. § 117 (freedom to use, archive, re-sale, and backup).

Many form contracts are only contained in digital form, and only presented to a user as a click-through where the user must "accept". As the user may not see the agreement until after he or she has already purchased the software, these documents may be contracts of adhesion.

Software companies often make special agreements with large businesses and government entities that include support contracts and specially drafted warranties.

Some end-user license agreements accompany shrink-wrapped software that

is presented to a user sometimes on paper or more usually electronically, during the installation procedure. The user has the choice of accepting or rejecting the agreement. The installation of the software is conditional to the user clicking a button labelled "accept". See below.

Many EULAs assert extensive liability limitations. Most commonly, an EULA will attempt to hold harmless the software licensor in the event that the software causes damage to the user's computer or data, but some software also proposes limitations on whether the licensor can be held liable for damage that arises through improper use of the software (for example, incorrectly using tax preparation software and incurring penalties as a result). One case upholding such limitations on consequential damages is M.A. Mortenson Co. v. Timberline Software Corp., et al. Some EULAs also claim restrictions on venue and applicable law in the event that a legal dispute arises.

Some copyright owners use EULAs in an effort to circumvent limitations the applicable copyright law places on their copyrights (such as the limitations in sections 107–122 of the United States Copyright Act), or to expand the scope of control over the work into areas for which copyright protection is denied by law (such as attempting to charge for, regulate or prevent private performances of a work beyond a certain number of performances or beyond a certain period of time). Such EULAs are, in essence, efforts to gain control, by contract, over matters upon which copyright law precludes control. This kind of EULAs concurs in aim with DRM and both may be used as alternate methods for widening control over software.

In disputes of this nature in the United States, cases are often appealed and different circuit courts of appeal sometimes disagree about these clauses. This provides an opportunity for the U.S. Supreme Court to intervene, which it has usually done in a scope-limited and cautious manner, providing little in the way of precedent or settled law.

Comparison with free software licenses

A free software license grants users of that software the rights to use for any purpose, modify and redistribute creative works and software, both of which are forbidden by the defaults of copyright, and generally not granted with proprietary software. These licenses

typically include a disclaimer of warranty, but this feature is not unique to free software. [2] Copyleft licenses also include a key addition provision that must be followed in order to copy or modify the software, that requires the user to provide source code for the work and to distribute their modifications under the same license (or sometimes a compatible one); thus effectively protecting derivative works from losing the original permissions and being used in proprietary programs.

Unlike EULAs, free software licenses do not work as contractual extensions to existing legislation. No agreement between parties is ever held, because a copyright license is simply a declaration of permissions on something that otherwise would be disallowed by default under copyright law.

Shrink-wrap and click-wrap licenses

The term shrink-wrap license refers colloquially to any software license agreement which is enclosed within a software package and is inaccessible to the customer until after purchase. Typically, the license agreement is printed on paper included inside the boxed software. It may also be presented to the user on-screen during installation, in which case the license is sometimes referred to as a click-wrap license. The inability of the customer to review the license agreement before purchasing the software has caused such licenses to run afoul of legal challenges in some cases. Whether shrink-wrap licenses are legally binding differs between jurisdictions, though a majority of jurisdictions hold such licenses to be enforceable. At particular issue is the difference in opinion between two US courts in Klocek v. Gateway and Brower v. Gateway. Both cases involved a shrink-wrapped license document provided by the online vendor of a computer system. The terms of the shrink-wrapped license were not provided at the time of purchase, but were rather included with the shipped product as a printed document. The license required the customer to return the product within a limited time frame if the license was not agreed to. In Brower, New York's state appeals court ruled that the terms of the shrink-wrapped license document were enforceable because the customer's assent was evident by its failure to return the merchandise within the 30 days specified by the document. The U.S. District Court of Kansas in Klocek ruled that the contract of sale was complete at the time of the transaction, and the additional shipped terms

contained in a document similar to that in Brower did not constitute a contract, because the customer never agreed to them when the contract of sale was completed.

Further, in ProCD v. Zeidenberg, the license was ruled enforceable because it was necessary for the customer to assent to the terms of the agreement by clicking on an "I Agree" button in order to install the software. In Specht v. Netscape Communications Corp., however, the licensee was able to download and install the software without first being required to review and positively assent to the terms of the agreement, and so the license was held to be unenforceable.

Click-wrap license agreements refer to website based contract formation (see iLan Systems, Inc. v. Netscout Service Level Corp.). A common example of this occurs where a user must affirmatively assent to license terms of a website, by clicking "yes" on a pop-up, in order to access website features. This is therefore analogous to shrink-wrap licenses, where a buyer implied agrees to license terms by first removing the software package's shrink-wrap and then utilizing the software itself. In both types of analysis, focus is on the actions of end user and asks whether there is an explicit or implicit acceptance of the additional licensing terms.

Product liability:

Most licenses for software sold at retail disclaim (as far as local laws permit) any warranty on the performance of the software and limit liability for any damages to the purchase price of the software. One well-known case which upheld such a disclaimer is Mortenson v. Timberline.

Patent

In addition to the implied exhaustion doctrine, the distributor may include patent licenses along with software.

Reverse engineering:

Forms often prohibit users from reverse engineering. This may also serve to make it difficult to develop third-party software which interoperates with the licensed software, thus increasing the value of the publisher's solutions through decreased customer choice. In the United States, EULA provisions can preempt the reverse engineering rights implied by fair use, c.f. Bowers v. Baystate Technologies.

Some licenses purport to prohibit a user's right to release data on the performance

of the software, but this has yet to be challenged in court.

Enforceability of EULAs in the United States

This section about the legal enforceability of end-user license agreements relies too much on references to primary sources. Please improve this section about the legal enforceability of end-user license agreements by adding secondary or tertiary sources. (July 2015) (Learn how and when to remove this template message)

The enforceability of an EULA depends on several factors, one of them being the court in which the case is heard. Some courts that have addressed the validity of the shrinkwrap license agreements have found some EULAs to be invalid, characterizing them as contracts of adhesion, unconscionable, and/or unacceptable pursuant to the U.C.C.—see, for instance, Step-Saver Data Systems, Inc. v. Wyse Technology, Vault Corp. v. Quaid Software Ltd.. Other courts have determined that the shrinkwrap license agreement is valid and enforceable: see ProCD, Inc. v. Zeidenberg,[6] Microsoft v. Harmony Computers,[7] Novell v. Network Trade Center,[8] and Ariz. Cartridge Remanufacturers Ass'n v. Lexmark Int'l, Inc. may have some bearing as well. No court has ruled on the validity of EULAs generally; decisions are limited to particular provisions and terms.

The 7th Circuit and 8th Circuit subscribe to the "licensed and not sold" argument, while most other circuits do not[citation needed]. In addition, the contracts' enforceability depends on whether the state has passed the Uniform Computer Information Transactions Act (UCITA) or Anti-UCITA (UCITA Bomb Shelter) laws. In Anti-UCITA states, the Uniform Commercial Code (UCC) has been amended to either specifically define software as a good (thus making it fall under the UCC), or to disallow contracts which specify that the terms of contract are subject to the laws of a state that has passed UCITA.

Recently, publishers have begun to encrypt their software packages to make it impossible for a user to install the software without either agreeing to the license agreement or violating the Digital Millennium Copyright Act (DMCA) and foreign counterparts.

The DMCA specifically provides for reverse engineering of software for interoperability purposes, so there was some controversy as to whether software

license agreement clauses which restrict this are enforceable. The 8th Circuit case of Davidson & Associates v. Jung determined that such clauses are enforceable, following the Federal Circuit decision of Baystate v. Bowers.

Criticism

One common criticism of end-user license agreements is that they are often far too lengthy for users to devote the time to thoroughly read them. In March 2012, the PayPal end-user license agreement was 36,275 words long and in May 2011 the iTunes agreement was 56 pages long. News sources reporting these findings asserted that the vast majority of users do not read the documents because of their length.

Several companies have parodied this belief that users do not read the end-user-license agreements by adding unusual clauses, knowing that few users will ever read them. As an April Fool's Day joke, Gamestation added a clause stating that users who placed an order on April 1, 2010 agreed to irrevocably give their soul to the company, which 7,500 users agreed to. Although there was a checkbox to exempt out of the "immortal soul" clause, few users checked it and thus Gamestation concluded that 88% of their users did not read the agreement.[14] The program PC Pitstop included a clause in their end-user license agreement stating that anybody who read the clause and contacted the company would receive a monetary reward, but it took four months and over 3,000 software downloads before anybody collected it. During the installation of version 4 of the Advanced Query Tool the installer measured the elapsed time between the appearance and the acceptance of the end-user license agreements to calculate the average reading speed. If the agreements were accepted fast enough a dialog window “congratulated” the users to their absurdly high reading speed of several hundred words per second. South Park parodied this in the episode "HumancentiPad", where Kyle had neglected to read the terms of service for his last iTunes update and therefore inadvertently agreed to have Apple employees experiment upon him.

End-user license agreements have also been criticized for containing terms that impose onerous obligations on consumers. For example, Click-wrapped, a service that rates consumer companies according to how well they respect the rights of users, reports that they

increasingly include a term that prevents a user from suing the company in court.

Software licensing

Software license is a legal instrument (usually by way of contract law, with or without printed material) governing the use or redistribution of software. Under United States copyright law all software is copyright protected, in source code as also object code form.[2] The only exception is software in the public domain. A typical software license grants the licensee, typically an end-user, permission to use one or more copies of software in ways where such a use would otherwise potentially constitute copyright infringement of the software owner's exclusive rights under copyright law.

Software licenses and copyright law:

Most distributed software can be categorized according to its license type.

Two common categories for software under copyright law, and therefore with licenses which grant the licensee specific rights, are proprietary software and free and open source software (FOSS). The distinct conceptual difference between the two is the granting of rights to modify and re-use a software product obtained by a customer: FOSS software licenses both rights to the customer and therefore bundles the modifiable source code with the software ("open-source"), while proprietary software typically does not license these rights and therefore keeps the source code hidden ("closed source").

In addition to granting rights and imposing restrictions on the use of copyrighted software, software licenses typically contain provisions which allocate liability and responsibility between the parties entering into the license agreement. In enterprise and commercial software transactions these terms often include limitations of liability, warranties and warranty disclaimers, and indemnity if the software infringes intellectual property rights of others.

Unlicensed software outside the copyright protection is either public domain software (PD) or software which is non-distributed, non-licensed and handled as internal business trade secret. Contrary to popular belief, distributed unlicensed software (not in the public domain) is fully copyright protected, and therefore legally unusable (as no usage rights at all are granted by a license) until it passes into public domain after the copyright term. Examples for this are unauthorized software leaks or software

projects which are placed on public software repositories like GitHub without specified license. As voluntarily handing software into the public domain (before reaching the copyright term) is problematic in some international law domains (for instance the Law of Germany), there are also licenses granting PD-like rights, for instance the CC0 or WTFPL.

Ownership vs. licensing

In the United States, Section 117 of the Copyright Act gives the owner of a particular copy of software the explicit right to use the software with a computer, even if use of the software with a computer requires the making of incidental copies or adaptations (acts which could otherwise potentially constitute copyright infringement). Therefore, the owner of a copy of computer software is legally entitled to use that copy of software. Hence, if the end-user of software is the owner of the respective copy, then the end-user may legally use the software without a license from the software publisher.

As many proprietary "licenses" only enumerate the rights that the user already has under 17 U.S.C. § 117, and yet proclaim to take rights away from the user, these contracts may lack consideration. Proprietary software licenses often proclaim to give software publishers more control over the way their software is used by keeping ownership of each copy of software with the software publisher. By doing so, Section 117 does not apply to the end-user and the software publisher may then compel the end-user to accept all of the terms of the license agreement, many of which may be more restrictive than copyright law alone. The form of the relationship determines if it is a lease or a purchase, for example UMG v. Augusto or Vernor v. Autodesk, Inc.

The ownership of digital goods, like software applications and video games, is challenged by "licensed, not sold" EULAs of digital distributors like Steam. In the European Union, the European Court of Justice held that a copyright holder cannot oppose the resale of a digitally sold software, in accordance with the rule of copyright exhaustion on first sale as ownership is transferred, and questions therefore the "licensed, not sold" EULA.

Proprietary software licenses

The hallmark of proprietary software licenses is that the software publisher grants the use of one or more copies of

software under the end-user license agreement (EULA), but ownership of those copies remains with the software publisher (hence use of the term "proprietary"). This feature of proprietary software licenses means that certain rights regarding the software are reserved by the software publisher. Therefore, it is typical of EULAs to include terms which define the uses of the software, such as the number of installations allowed or the terms of distribution.

The most significant effect of this form of licensing is that, if ownership of the software remains with the software publisher, then the end-user must accept the software license. In other words, without acceptance of the license, the end-user may not use the software at all. One example of such a proprietary software license is the license for Microsoft Windows. As is usually the case with proprietary software licenses, this license contains an extensive list of activities which are restricted, such as: reverse engineering, simultaneous use of the software by multiple users, and publication of benchmarks or performance tests.

The most common licensing models are per single user (named user, client, node) or per user in the appropriate volume discount level, while some manufacturers accumulate existing licenses. These open volume license programs are typically called open license program (OLP), transactional license program (TLP), volume license program (VLP) etc. and are contrary to the contractual license program (CLP), where the customer commits to purchase a certain number of licenses over a fixed period (mostly two years). Licensing per concurrent/floating user also occurs, where all users in a network have access to the program, but only a specific number at the same time. Another license model is licensing per dongle which allows the owner of the dongle to use the program on any computer. Licensing per server, CPU or points, regardless the number of users, is common practice as well as site or company licenses. Sometimes one can choose between perpetual (permanent) and annual license. For perpetual licenses one year of maintenance is often required, but maintenance (subscription) renewals are discounted. For annual licenses, there is no renewal; a new license must be purchased after expiration. Licensing can be host/client (or guest), mailbox, IP address, domain etc., depending on how the program is used. Additional users are inter alia licensed per extension pack (e.g.

up to 99 users) which includes the base pack (e.g. 5 users). Some programs are modular, so one will have to buy a base product before they can use other modules.

Software licensing often also includes maintenance. This, usually with a term of one year, is either included or optional, but must often be bought with the software. The maintenance agreement (contract) contains minor updates (V.1.1 => 1.2), sometimes major updates (V.1.2 => 2.0) and is called e.g. update insurance, upgrade assurance. For a major update the customer has to buy an upgrade, if not included in the maintenance. For a maintenance renewal some manufacturers charge a reinstatement (reinstallment) fee retroactively per month, in case the current maintenance has expired. Maintenance normally doesn't include technical support. Here one can differentiate between e-mail and tel. support, also availability (e.g. 5x8, 5 days a week, 8 hours a day) and reaction time (e.g. three hours) can play a role. This is commonly named gold, silver and bronze support. Support is also licensed per incident as incident pack (e.g. five support incidents per year).

Many manufacturers offer special conditions for schools and government agencies (EDU/GOV license). Migration from another product (crossgrade), even from a different manufacturer (competitive upgrade) is offered.

Free and open-source software licenses

Diagram of software under various licenses according to the FSF and their The Free Software Definition: on the left side "free software", on the right side "proprietary software". On both sides, and therefore mostly orthogonal, "free download" (Freeware).

Main articles: Free software license and Open source software license

There are several organizations in the FOSS domain who give out guidelines and definitions regarding software licenses. Free Software Foundation maintains non-exhaustive lists of software licenses following their The Free Software Definition and licenses which the FSF considers non-free for various reasons. The FSF distinguishes additionally between free software licenses that are compatible or incompatible with the FSF license of choice, the copyleft GNU General Public License. The Open Source Initiative defines a list of certified open-source licenses following their The Open Source Definition. Also the Debian project

has a list of licenses which follow their Debian Free Software Guidelines.

Free and open-source licenses are commonly classified into two categories: Those with the aim to have minimal requirements about how the software can be redistributed (permissive licenses), and the protective share-alike (copyleft Licenses).

An example of a copyleft free software license is the often used GNU General Public License (GPL), also the first copyleft license. This license is aimed at giving and protecting all users unlimited freedom to use, study, and privately modify the software, and if the user adheres to the terms and conditions of the GPL, freedom to redistribute the software or any modifications to it. For instance, any modifications made and redistributed by the end-user must include the source code for these, and the license of any derivative work must not put any additional restrictions beyond what the GPL allows.

Examples of permissive free software licenses are the BSD license and the MIT license, which give unlimited permission to use, study, and privately modify the software, and includes only minimal requirements on redistribution. This gives a user the permission to take the code and use it as part of closed-source software or software released under a proprietary software license.

It was under debate some time if public domain software and public domain-like licenses can be considered as a kind of FOSS license. Around 2004 lawyer Lawrence Rosen argued in the essay "Why the public domain isn't a license" software could not truly be waived into public domain and can't therefore be interpreted as very permissive FOSS license, a position which faced opposition by Daniel J. Bernstein and others. In 2012 the dispute was finally resolved when Rosen accepted the CC0 as open source license, while admitting that contrary to his previous claims copyright can be waived away, backed by Ninth circuit decisions.

Abandonware and the General Opinion

Abandonware, software that is unsupported and obsolete yet still covered by copyright, has been an ongoing legality topic with no definitive precedent case determining its verdict of being legal or not. Although most argue that abandonware is software still technically covered by an unexpired copyright by the software company, there

is another clause in the issue that many don't consider when classifying a piece of software as legal to distribute or not, which centers around enforcement.

The issue of abandonware is as old as the first time software has gone unsupported/undistributed for personal computers. Some argue in favor of the term as a label for software that has gone unsupported by its manufacturer after a given amount of time, whereas others classify it as a loose term for software that, although unsupported and unsold/undistributed, still falls within the bounds of copyright law. The latter argument is true: abandonware is not public domain. Despite this, however, it is both unsupported and generally not available for purchase directly from the original manufacturer (eBay does not count). With this in mind, there is another argument in favor of the distribution of abandonware that comes directly to (my) mind: if the law if not actively enforced, can it be broken? My rational is this: there are currently hundreds of pointless laws on the books in various states that were enacted during a period when they were useful (and enforced), but now are simply ignored due to either lack of knowledge or in the more sensible case, are not enforced due to a genuine lack of a need for them.

Abandonsware Associated Impliactions

If a software product reaches end-of-life and becomes abandonware, users are confronted with several potential problems: missing purchase availability (besides used software) and missing technical support, e.g. compatibility fixes for newer hardware and operating systems. These problems are exacerbated if software is bound ("dongle") to physical media with a limited life-expectancy (floppy discs, optical media etc.) and backups are impossible because of copy protection or copyright law. If a software is only distributed in a digital, DRM-locked form or as SaaS, the shutdown of the servers will lead to a public loss of the software. If the software product is without alternative, the missing replacement availability becomes a challenge for continued software usage.

Also, once a software product has become abandonware for a developer, even historically important software might get lost forever very easily, as several examples have shown.One of many examples is the closure of Atari in Sunnyvale, California in 1996, when the

original source code of several milestones of video game history (like Asteroids or Centipede) was thrown out as trash.

Also, the missing availability of software and the associated source code can be a hindrance for software archeology and research.

The authority of a court to hear a case and resolve a dispute involving person, property and subject matter is referred as the jurisdiction of that court. It is the legislative function of the Government to enact laws and judicial and/or administrative function to enforce those laws. Thus, the principles of jurisdiction followed by a State must not exceed the limits which international law places upon its jurisdiction.

Early abandonware websites

As response to the missing availability of abandonware, people have distributed old software since shortly after the beginning of personal computing, but the activity remained low-key until the advent of the Internet. While trading old games has taken many names and forms, the term "abandonware" was coined by Peter Ringering in late 1996. Ringering found classic game websites similar to his own, contacted their webmasters, and formed the original Abandonware Ring in February 1997.This original webring was little more than a collection of sites linking to adventureclassicgaming.com. Another was a site indexing them all to provide a rudimentary search facility. In October 1997, the Interactive Digital Software Association sent cease and desist letters to all sites within the Abandonware Ring, which led to most shutting down. An unintended consequence (called the Streisand effect in Internet parlance) was that it spurred others to create new abandonware sites and organizations that came to outnumber the original Ring members. Sites formed after the demise of the original Abandonware Ring include Abandonia, Bunny Abandonware and Home of the Underdogs. In later years Abandonware websites actively acquired and received permissions from developers and copyright holders (e.g. Jeff Minter, Magnetic Fields or Gremlin Interactive) for legal redistribution of abandoned works, an example is World of Spectrum who acquired the permission from many developers and successfully retracted a DMCA case.

Archives

Several websites archive abandonware for download, including old versions of applications which are difficult to find by

any other means. Much of this software fits the definition of "software that is no longer current, but is still of interest", but the line separating the use and distribution of abandonware from copyright infringement is blurry, and the term abandonware could be used to distribute software without proper notification of the owner.

The Internet Archive has created an archive of what it describes as "vintage software", as a way to preserve them. The project advocated for an exemption from the United States Digital Millennium Copyright Act to permit them to bypass copy protection, which was approved in 2003 for a period of three years. The exemption was renewed in 2006, and as of 27 October 2009, has been indefinitely extended pending further rule makings. The Archive does not offer this software for download, as the exemption is solely "for the purpose of preservation or archival reproduction of published digital works by a library or archive." Nevertheless, in 2013 the Internet Archive began to provide antique games as browser-playable emulation via MESS, for instance the Atari 2600 game E.T. the Extra-Terrestrial. Since 23 December 2014 the Internet Archive presents via a browser based DOSBox emulation thousands of archived DOS/PC games for "scholarship and research purposes only". Also the Library of Congress began the long-time preservation of video games with the Game canon list around 2006. In September 2012 the collection had nearly 3,000 games from many platforms and also around 1,500 strategy guides. For instance, the source code of the unreleased PlayStation Portable game Duke Nukem: Critical Mass was discovered in August 2014 to be preserved at the Library of Congress.

Since around 2009 the International Center for the History of Electronic Games (ICHEG) has taken a five-pronged approach to video game preservation: original software and hardware, marketing materials and publications, production records, play capture, and finally the source code. In December 2013 the ICHEG received a donation of several SSI video games, for instance Computer Bismarck, including the source code for preservation. In 2014 a collection of Brøderbund games and a "virtually complete" Atari arcade machine source code and asset collection was added.

In 2010 Computer History Museum began with the preservation of source code of important software, beginning with Apple's MacPaint 1.3.In 2012 the APL programming language followed. Adobe

Systems, Inc. donated the Photoshop 1.0.1 source code to the collection in February 2013. The source code is made available to the public under an own non-commercial license. On March 25, 2014, Microsoft followed with the donation of MS-DOS variants as well as Word for Windows 1.1a under their own license. On October 21, 2014, Xerox Alto's source code and other resources followed.

In 2012 a group of European museums and organizations started the European Federation of Game Archives, Museums and Preservation Projects (EFGAMP) to join forces to "Preserve Gaming Legacy". Also in Japan video game software archival happens since several years.

In 2012 the MOMA started with archiving video games and explicitly tries to get the source code of them.

There are also some cases in which the source code of games was given to a fan community for long-time preservation, e.g. several titles of the Wing Commander video game series or Ultima 9 of the Ultima series. In 2008 a hard-drive with all Infocom video game source code appeared from an anonymous source and was archived additionally by the Internet Archive.

Community support

In response to the missing software support, sometimes the software's user community begins to provide support (bug fixes, compatibility adaptions etc.) even without available source code, internal software documentation and original developer tools. Methods are debugging, reverse engineering of file and data formats, and hacking the binary executables. Often the results are distributed as unofficial patches. Notable examples are Fallout 2, Vampire: The Masquerade – Bloodlines[64] or even Windows 98. For instance in 2012, when the multiplayer game Supreme Commander: Forged Alliance became unsupported abandonware as the official multiplayer server and support was shut down, the game community itself took over with a self-developed multiplayer server and client.

Re-releases by digital distribution

With the new possibility of digital distribution arising in mid-2000, the commercial distribution for many old titles became feasible again as deployment and storage costs dropped significantly. A digital distributor specialized in bringing old games out of abandonware is GOG.com (formerly called Good Old Games) who started in 2008 to search for copyright holders of classic games to release them legally and DRM-free again. For instance, on December 9, 2013 the real-time strategy

video game Conquest: Frontier Wars was, after ten years of non-availability, re-released by gog.com, also including the source code.

Arguments for and against distribution

Proponents of abandonware preservation argue that it is more ethical to make copies of such software than new software that still sells. Those ignorant of copyright law have incorrectly taken this to mean that abandonware is legal to distribute, although no software written since 1964 is old enough for copyright to have expired in the US. Even in cases where the original company no longer exists, the rights usually belong to someone else, though no one may be able to trace actual ownership, including the owners themselves.

Abandonware advocates also frequently cite historical preservation as a reason for trading abandoned software.Older computer media are fragile and prone to rapid deterioration, necessitating transfer of these materials to more modern, stable media and generation of many copies to ensure the software will not simply disappear. Users of still-functional older computer systems argue for the need of abandonware because re-release of software by copyright holders will most likely target modern systems or incompatible media instead, preventing legal purchase of compatible software.

Those who oppose these practices argue that distribution denies the copyright holder potential sales, in the form of re-released titles, official emulation, and so on. Likewise, they argue that if people can acquire an old version of a program for free, they may be less likely to purchase a newer version if the old version meets their needs.

Some game developers showed sympathy for abandonware websites as they preserve their classical game titles.

Legal Issues Associated with Abandonware

In most cases, software classed as abandonware is not in the public domain, as it has never had its original copyright officially revoked and some company or individual may still own rights. While sharing of such software is usually considered copyright infringement, in practice copyright holders rarely enforce their abandonware copyrights for a number of reasons – chiefly among which the software is technologically obsolete and therefore has no commercial value, therefore rendering copyright enforcement a pointless enterprise. By default, this may allow the product to defacto lapse into the public domain to

such an extent that enforcement becomes impractical. Rarely has any abandonware case gone to court. But it is still unlawful to distribute copies of old copyrighted software and games, with or without compensation, in any Berne Convention signatory country.

Enforcement of copyright

Old copyrights are usually left undefended. This can be due to intentional non-enforcement by owners due to software age or obsolescence, but sometimes results from a corporate copyright holder going out of business without explicitly transferring ownership, leaving no one aware of the right to defend the copyright.

Even if the copyright is not defended, copying of such software is still unlawful in most jurisdictions when a copyright is still in effect. Abandonware changes hands on the assumption that the resources required to enforce copyrights outweigh benefits a copyright holder might realize from selling software licenses. Additionally, abandonware proponents argue that distributing software for which there is no one to defend the copyright is morally acceptable, even where unsupported by current law. Companies that have gone out of business without transferring their copyrights are an example of this; many hardware and software companies that developed older systems are long since out of business and precise documentation of the copyrights may not be readily available.

Often the availability of abandonware on the Internet is related to the willingness of copyright holders to defend their copyrights. For example, unencumbered games for Colecovision are markedly easier to find on the Internet than unencumbered games for Mattel Intellivision in large part because there is still a company that sells Intellivision games while no such company exists for the Colecovision.

DMCA

The Digital Millennium Copyright Act (DMCA) can be a problem for the preservation of old software as it prohibits required techniques. In October 2003, the US Congress passed 4 clauses to the DMCA which allow for reverse engineering software in case of preservation.

3. Computer programs and video games distributed in formats that have become obsolete and which require the original media or hardware as a condition of access. The register has concluded that to the extent that libraries and archives wish to make preservation copies of published software and video games that

were distributed in formats that are (either because the physical medium on which they were distributed is no longer in use or because the use of an obsolete operating system is required), such activity is a noninfringing use covered by section 108(c) of the Copyright Act."

Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies.

In November 2006 the Library of Congress approved an exemption to the DMCA that permits the cracking of copy protection on software no longer being sold or supported by its copyright holder so that they can be archived and preserved without fear of retribution.

US copyright law

Currently, US copyright law does not recognize the term or concept of "abandonware" while the general concept "orphan works" is recognized (see Orphan works in the United States). There is a long held concept of abandonment in trademark law as a direct result of the infinite term of trademark protection. Currently, a copyright can be released into the public domain if the owner clearly does so in writing; however this formal process is not considered abandoning, but rather releasing. Those who do not own a copyright cannot merely claim the copyright abandoned and start using protected works without permission of the copyright holder, who could then seek legal remedy.

Hosting and distributing copyrighted software without permission is illegal. Copyright holders, sometimes through the Entertainment Software Association, send cease and desist letters, and some sites have shut down or removed infringing software as a result. However, most of the Association's efforts are devoted to new games, due to those titles possessing the greatest value.

However, the original copyright holder may be barred from bringing a court action, via a civil doctrine known as laches, which requires litigants to bring a viable civil action within a reasonable amount of time.

EU law

In the EU in 2012 an "Orphan Works Directive" (Directive 2012/28/EU) was constituted and is transferred into the member's laws. While the terminology has ambiguities regarding software and especially video games, some scholars argue that Abandonware software video games fall under the definition of audiovisual works mentioned there.

Copyright expiration:

Main article: List of countries' copyright length. Once the copyright on a piece of

software has expired, it automatically falls into public domain. Such software can be legally distributed without restrictions. However, due to the length of copyright terms in most countries, this has yet to happen for most software. All countries that observe the Berne Convention enforce copyright ownership for at least 50 years after publication or the author's death. However, individual countries may choose to enforce copyrights for longer periods. In the United States, copyright durations are determined based on authorship. For most published works, the duration is 70 years after the author's death. However, for anonymous works, works published under a pseudonym or works made for hire, the duration is 120 years after publication. In France, copyright duration's are 70 years after the relevant date (date of author's death or publication) for either class.

However, because of the length of copyright enforcement in most countries, it is likely that by the time a piece of software defaults to public domain, it will have long become obsolete, irrelevant, or incompatible with any existing hardware. Additionally, due to the relatively short commercial, as well as physical, lifespans of most digital media, it is entirely possible that by the time the copyright expires for a piece of software, it will no longer exist in any form. However, since the largest risk in dealing with abandonware is that of distribution, this may be mitigated somewhat by private users (or organizations such as the Internet Archive) making private copies of such software, which would then be legally redistributable at the time of copyright expiry.

Alternatives to software abandoning

There are alternatives for companies with a software product which faces the end-of-life instead of abandoning the software in an unsupported state.

Availability as freeware

Sometimes user-communities convince companies to voluntarily relinquish copyright on software, putting it into the public domain, or re-license it as free software or as freeware. Transfer of public domain or freely licensed software is perfectly legal, distinguishing it from abandonware which still has full copyright restrictions.

Amstrad is an example which supports emulation and free distribution of CPC and ZX Spectrum hardware ROMs and software.Borland is another example for a company who released "antique software" as freeware.Smith Engineering permits not-for-profit reproduction and

distribution of Vectrex games and documentation.

There are groups that lobby companies to release their software as freeware. These efforts have met with mixed results. One example is the library of educational titles released by MECC. MECC was sold to Brøderbund, which was sold to The Learning Company. When TLC was contacted about releasing classic MECC titles as freeware, the documentation proving that TLC held the rights to these titles could not be located, and therefore the rights for these titles are "in limbo" and may never be legally released. That the copyright situation of vintage out-of-print software is lost or unclear is not uncommon.

Support by source code release

Main article: List of commercial video games with later released source code.

The problem of missing technical support for a software can be most effectively solved when the source code becomes available. Therefore, several companies decided to release the source code specifically to allow the user communities to provide further technical software support (bug fixes, compatibility adaptions etc.) themselves, e.g. by community patches or source ports to new computing platforms. For instance, in December 2015 Microsoft released the Windows Live Writer source code to allow the community to continue the support.

Interpretation of Abandonware and Copyright :

Abandon-wares are non-perishable assets which can be used betterment for the society with proper mediation, legal attention, procedural refinement, Research and development. The proper governing body should regularize the usage of abandon-ware between the Abndonware user and the original software owner.

Social Impacts

Innovative and creative people will be encouraged by allowing them to explore the softwares which are abandoned. The software can further be refined and extended instead of abandoned and obsolete in non- workable.

Educational purpose abandonware should be used and the resultant outcome enhances the discipline in a next level.

Economic Impacts

Abandon-wares pose considerable economic impact in that particular industry. The exploitation of such abandon software and the associated commercial issues are not yet dealt or impacted in big way but it will be expected as similar to any other software copy right violation in near future .

The fair use concept are tagged here with factors considered upon the original owners stand on the Abandonware.

Legal Impacts:

Abandon-wares inherits legal issues though the abandonwares named as 'Abandonware'. The licensing, agreement, contract and IP related rights over the software decides whether abandonwares are actually abandoned or virtually abandoned.

If actually abandoned the original owner should not have any rights over the software so its open to anyone to use or exploit commercially.

If virtually abandoned the original owner has some or complete rights over the software in this case if the abandonware user exploits the software the consequences are discretionary with the original owner.

The virtual abandoned software needs fair regulation because of the commercial exploitation. The abandonware user could possibly be circumvented by the original owner by his rights over the abandoned software.

Conclusion

Abandonwares are non-perishable assets which can be used betterment for the society with proper mediation, legal attention, procedural refinement, research and development. The proper governing body should regularize the usage of abandon-ware among the abandonware users and to remediate issues between the Abndonware user and the original software owner.

The regulation brings the digital junkies in meaningful way where it enhances the research avenues in the discipline of software industries. The commercial balance can also be achieved between the abandonware user and the original owner.

Intellectual Property especially the copyright should have the provision for abandoned software "Abandonware". The unnecessary legal issues can be avoided if the IP clearly mentioned about the use of abandonware and the commercial exploitation of the same.

The win –win situation can be accomplished by regulating abandonware so that abandonware users as well as the original owner would be dealing the issues fairly.

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International Journal of Innovative Technology and Creative Engineering - IJITCE (ISSN:2045-8711) Vol.15 No.02 Feb 2025

Countering Akira Ransomware: Detection, Containment, and Recovery through a Layered Defense Strategy

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Abstract

Akira ransomware presents a formidable threat with its double-extortion tactics, combining data exfiltration and encryption to increase leverage over victims. This paper explores the primary tactics of Akira ransomware and provides a comprehensive defense strategy, encompassing detection, containment, and recovery. By implementing a layered approach, organizations can mitigate the risk of ransomware infection, reduce potential damage, and recover with minimal impact.

Keywords: Akira Ransomware, Double Extortion, , Data Exfiltration, Ransomware Defense, Layered Defense Strategy, Threat Detection. Endpoint Detection and Response (EDR), Privilege Escalation, Indicators of Compromise (IOCs), Network Segmentation, Disaster Recovery (DR) Planning, Behavioral Analytics, . Security Awareness Training, Data Loss Prevention (DLP), Ransomware Containment, Immutable Backups, User Behavior Analytics (UBA), Threat Intelligence.

1. Introduction

Ransomware attacks have become a severe threat to organizations globally, with incidents rising exponentially each year. Akira ransomware, a relatively recent entry into the ransomware ecosystem, epitomizes this growing threat with its highly sophisticated tactics, including data exfiltration and encryption. This paper investigates the unique methods employed by Akira ransomware and offers a structured approach to defense. By implementing a layered defense strategy, organizations can not only detect and contain ransomware but also expedite recovery following an attack.

2. Akira Ransomware Tactics

Akira ransomware employs a "double-extortion" model, whereby attackers exfiltrate data before encrypting it. This approach serves two purposes: increasing the likelihood of ransom payment by threatening data exposure, and intensifying operational impact through data encryption. Below, we discuss Akira's data exfiltration and encryption processes and how they elevate the threat level of this ransomware.

Data Exfiltration: Akira gains entry through weak Remote Desktop Protocol (RDP) credentials, phishing, or software vulnerabilities. Upon gaining access, attackers seek to escalate privileges by harvesting administrator credentials. The ransomware targets sensitive business data, which is then exfiltrated via tools like Rclone and other cloud storage services. These tools allow Akira to transfer data out of the network while avoiding detection by mimicking legitimate network traffic (Smith 2023).

Encryption Process: Once data is exfiltrated, Akira uses robust encryption algorithms to lock files and renders them inaccessible to the organization. The ransomware typically appends a unique ".akira" extension to encrypted files, making identification straightforward. Akira leaves a ransom note with payment instructions, threatening to leak the data if demands are not met.

3. Detection Measures

Detecting Akira ransomware early is critical to minimizing damage. Several layered detection strategies help in identifying Akira ransomware's activity before it can fully execute its objectives.

Perimeter Defense: Firewalls and Intrusion Detection and Prevention Systems (IDPS) should be configured to filter out known Akira-related indicators of compromise (IOCs), such as IP addresses and patterns associated with exfiltration (Jones 2024). Anomaly-based detection methods can also flag suspicious network traffic patterns, like sudden high-volume data transfers to unfamiliar IPs.

Endpoint Detection and Response (EDR): Behavioral analytics in EDR solutions monitor endpoints for unusual activities such as encryption behavior, registry changes, or CPU spikes indicative of ransomware. Threat hunting exercises can also be configured to scan for ".akira" file extensions or unauthorized privilege escalation attempts (Doe 2022).

Log Management and Analysis: Security Information and Event Management (SIEM) solutions aggregate logs across the network, offering comprehensive visibility. By configuring alerts for Akira-related IOCs, SIEM systems can detect early warning signs of ransomware activity (Johnson 2023).

4. Containment Measures

Upon detecting Akira ransomware, quick containment measures are essential to prevent its spread.

Network Segmentation: Isolating infected systems from the network is essential. Automated responses in EDR or SIEM tools can help quarantine affected machines. Network segmentation reduces

the attacker's ability to propagate the ransomware across critical infrastructure.

Privilege Management: By enforcing the Least Privilege Access (LPA) principle, organizations can limit Akira's lateral movement. Additionally, User Behavior Analytics (UBA) can monitor deviations in user actions that may indicate unauthorized access or escalation (Lee 2023).

Blocking Exfiltration Tools: Application whitelisting allows only approved software to run, limiting Akira's ability to use exfiltration tools like Rclone. Data Loss Prevention (DLP) solutions can also flag or block suspicious data transfers to untrusted external sources.

5. Recovery Strategies

If Akira ransomware does encrypt data, effective recovery is critical for minimizing downtime.

Offline Backups: Regular offline backups prevent ransomware from infecting backup data. Storing backups in immutable storage ensures data integrity, allowing for quick restoration in the event of an attack (Miller 2023).

Disaster Recovery (DR) Planning: Comprehensive DR plans provide a roadmap for system restoration. Response playbooks that include containment, isolation, and prioritization procedures allow for faster response times.

Stakeholder Communication: Transparent communication with stakeholders and law enforcement is essential. If exfiltration occurs, coordinating with law enforcement can assist in tracking the attackers and potentially recovering compromised data (Carter 2023).

6. Implementing and Regularly Updating Security Protocols

The effectiveness of these layered defense strategies depends on ongoing testing, updates, and refinement.

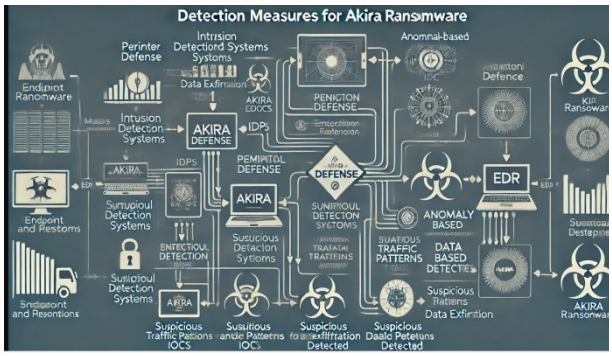
Security Awareness Training: Regular employee training on identifying phishing attempts reduces the risk of initial infection vectors. Phishing simulations and security training ensure that employees are well-prepared to recognize suspicious activity.

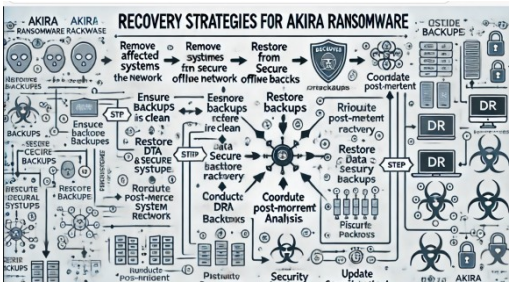
Patch Management: Consistent software updates and patch management reduce exploitable vulnerabilities, particularly in RDP and email clients, commonly targeted by ransomware.

Post-Incident Analysis: Post-mortem analysis of incidents allows organizations to document lessons learned, updating protocols and bolstering defenses.

Akira ransomware represents an advanced threat that requires a sophisticated response. A layered defense strategy—encompassing detection, containment, and recovery—offers robust protection against such threats. Regular testing, training, and protocol updates enhance an organization's resilience, allowing for a proactive and effective response. As ransomware threats evolve, maintaining a multi-faceted defense approach ensures that organizations remain well-protected

against the devastating impact of ransomware attacks.





Double Extortion Model is a tactic used in ransomware attacks where attackers not only encrypt a victim's data but also exfiltrate (steal) it before encryption. This two-pronged approach increases the pressure on victims to pay the ransom by adding an additional layer of threat:

1. Data Encryption: Attackers encrypt the data on the victim's systems, rendering it unusable and halting operations. This alone demands a ransom payment for the decryption key.

2. Data Exfiltration: Prior to encryption, attackers steal sensitive data. They then threaten to publicly leak or sell this data if the ransom isn't paid, risking exposure of sensitive information and potential regulatory consequences for the victim.

This tactic increases leverage over victims, as organizations face both operational disruptions from the encryption and reputational, financial, and legal repercussions from the exfiltrated data.

How Double Extortion Works:

1. Initial Access and Reconnaissance: Attackers gain access through phishing, weak credentials, or vulnerabilities, then map out valuable data within the network.

2. Data Exfiltration: Using secure channels or external servers, attackers siphon off sensitive information.

3. Data Encryption: Once the data is exfiltrated, ransomware encrypts the files on the victim's systems.

4. Ransom Demands: Attackers demand payment for both the decryption key and the promise to keep exfiltrated data private.

Impact of Double Extortion on Defense Strategy

Double extortion increases the complexity of ransomware defense. Organizations now need a defense model that not only detects and prevents encryption but also addresses unauthorized data access and exfiltration. This calls for advanced monitoring, data loss prevention (DLP) tools, and proactive network segmentation to limit attackers' access to sensitive data.

Rclone is a command-line program widely used for managing and syncing files across various cloud storage providers. It supports many popular services, including Google Drive, Amazon

S3, Dropbox, OneDrive, and others. Originally developed for legitimate cloud storage management, Rclone has gained attention as a potential tool for data exfiltration in ransomware attacks, particularly because of its ability to rapidly transfer large volumes of data across networks.

Key Features of Rclone

1. Wide Cloud Support: Rclone supports many cloud storage services and protocols (e.g., FTP, SFTP, HTTP, WebDAV), making it a flexible option for data management.

2. Efficient Transfers: It can transfer large data sets quickly, with features such as multi-threaded file transfers, bandwidth management, and resume support, which optimize transfer speeds.

3. Encryption: Rclone can encrypt files before transferring them, adding a layer of privacy to data backups.

4. Sync and Mirror Functions: It allows for mirroring directories across storage, which is valuable for data synchronization between local and cloud storage locations.

Rclone in Data Exfiltration

Because of its efficiency and ability to work with cloud services, Rclone is sometimes abused by threat actors, particularly in double extortion ransomware attacks:

- Stealthy Exfiltration: Rclone's capabilities enable attackers to mimic legitimate data traffic, making exfiltration less detectable.
- Easy Integration with Scripts: Rclone can be scripted to automate data transfers, so attackers can set up exfiltration tasks that run with minimal intervention.
- Cloud Storage: By transferring data to cloud storage, attackers remove the need for maintaining their own servers, potentially increasing the difficulty of tracing the data.

Mitigating Rclone Misuse

- Network Monitoring: Setting up alerts for large, unexpected transfers to cloud storage or unusual outbound traffic patterns.
- Application Whitelisting: Restricting Rclone use on systems where it is not required, along with **o**ther command-line tools not typically needed.
- Data Loss Prevention (DLP): DLP tools can monitor and block unauthorized data movements, particularly to external storage locations.
- Behavioral Analytics: Monitoring for unusual activity patterns, such as sudden use of cloud sync tools by unauthorized accounts or at unusual times.

By understanding Rclone's capabilities and monitoring for abnormal usage, organizations can mitigate the risk of data exfiltration using this tool.

This malware variant targets various organizations and has been active recently. Akira ransomware typically exfiltrates data before encryption, using the double-extortion tactic—threatening to leak stolen data if the ransom isn't paid.

Akira ransomware has emerged as a significant threat in recent times, focusing on businesses and organizations across various sectors. It has a distinct approach and specific tactics that make it a formidable adversary. Here's a deeper analysis of its behavior, key tactics, and methods for detection and prevention:

1. Behavioral Overview

- Double Extortion Technique: Akira combines traditional file encryption with data exfiltration, a two-pronged approach known as double extortion. Attackers exfiltrate sensitive data before encrypting it, giving them leverage by threatening to publish stolen information if the ransom isn't paid.

- Targeting Specific File Types: Akira avoids encrypting files essential to system operation, focusing instead on user and business data to ensure that systems can still boot and the ransom demand can be displayed. This selective targeting also minimizes the risk of system corruption that might impede negotiation with victims.

- Use of Unique File Extensions: Files encrypted by Akira often receive a unique extension, usually ".akira," making it easier for victims to recognize the affected files.

2. Delivery & Propagation

- Initial Access: Akira commonly exploits weak or compromised Remote Desktop Protocol (RDP) credentials, phishing emails, and vulnerabilities in public-facing applications. Gaining an initial foothold often involves using brute-force or stolen credentials, which highlights the importance of strong authentication practices.

- Lateral Movement: Once inside a network, Akira uses tools like Cobalt Strike, PsExec, or living-off-the-land (LOTL) tactics to move laterally. It may also disable or bypass endpoint security measures to maintain persistence.

- Data Exfiltration: Akira uses exfiltration tools like Rclone, Mega.nz, or other cloud storage services to steal data before encryption. This stolen data is then used as leverage, increasing pressure on the victim to pay the ransom.

3. Encryption Process

- Encryption Algorithm: Akira uses robust encryption algorithms, such as AES and RSA, to lock files, rendering data inaccessible to users. Each victim receives a unique encryption key, stored on the attacker's server, which they provide upon receiving the ransom payment.

- Ransom Note: Following encryption, Akira leaves a ransom note (typically named "akira_readme.txt") that outlines the attacker's demands and provides instructions for payment, often via cryptocurrency, along with a communication method.

4. Indicators of Compromise (IOCs)

Detecting Akira involves recognizing various indicators of compromise (IOCs), which can help organizations take early action. These indicators include:

- Suspicious Network Traffic: Increased outbound traffic, especially to unknown IP addresses or unusual domains, can indicate data exfiltration.

- Unusual User Activity: Logins from unusual locations or at odd hours are often signs of an ongoing attack.

- File Changes: Files with the ".akira" extension, along with the appearance of ransom notes, are definitive signs of this ransomware.

- Modified Security Settings: Akira often attempts to disable or tamper with security solutions. Changes in endpoint security configurations may signal its presence.

5. Detection Techniques

- Endpoint Detection and Response (EDR): EDR solutions can detect and contain ransomware before it spreads. These tools monitor system behavior, enabling faster detection and response to unusual activities.

- Network Traffic Analysis: Monitoring for abnormal data transfers can reveal potential data exfiltration attempts. Advanced network detection tools can alert administrators to unusual traffic patterns.

- Behavioral Analysis: Anomaly detection algorithms are increasingly effective in identifying ransomware by recognizing abnormal system or network behavior indicative of an attack.

6. Mitigation and Prevention

- Multi-Factor Authentication (MFA): Ensuring MFA is enabled on all user accounts, particularly for RDP, minimizes the risk of brute-force attacks.

- Regular Backups: Frequent backups, stored offline, can mitigate the damage by allowing data restoration without paying a ransom.

- Phishing Awareness Training: Educating employees about phishing can reduce the likelihood of initial access through malicious emails.

- Patch Management: Keeping systems and applications updated reduces vulnerabilities that Akira might exploit.

- Network Segmentation: Isolating sensitive data and critical systems limits the ransomware's ability to access and exfiltrate all valuable data.

7. Incident Response in Case of Infection

- Isolate Affected Systems: Immediate isolation of infected machines prevents ransomware from spreading.

- Conduct Forensic Analysis: Investigating the attack's root cause helps in understanding how it happened and aids in bolstering defenses.

- Report the Incident: Reporting ransomware incidents to relevant authorities may assist in tracking ransomware groups and developing broader solutions.

Akira ransomware's combination of data exfiltration and encryption makes it particularly challenging, but adopting a layered defense strategy and staying vigilant against its IOCs can significantly reduce the risk of a successful attack.

Akira ransomware's approach to data exfiltration and encryption tactics exemplifies modern ransomware sophistication, leveraging multiple techniques to ensure both financial pressure on victims and operational impact. Here's a closer look at how Akira's data exfiltration works and how a layered defense strategy can effectively counteract its techniques:

1. Akira Ransomware Data Exfiltration Tactics

- Data Exfiltration Steps:

1. Initial Access: Akira typically gains entry through weak RDP credentials, phishing, or exploiting software vulnerabilities.

2. Credential Harvesting: Once inside, attackers search for administrator or privileged credentials to broaden their access.

3. Data Identification and Collection: The ransomware group targets sensitive data, including customer records, financial information, and proprietary business files.

4. Data Transfer to External Servers: Tools like Rclone or cloud services such as Mega.nz are used to transfer data out of the network. Using these widely available tools helps attackers avoid detection by blending in with legitimate network traffic.

- Purpose of Exfiltration: The attackers use exfiltrated data to threaten to release sensitive information unless a ransom is paid. This double-extortion tactic increases the likelihood that victims will comply, as even having backups won't prevent the threat of a data leak.

2. Layered Defense Strategy Against Ransomware

Implementing a layered defense strategy is crucial for reducing the risk and impact of ransomware attacks like Akira. Here's how:

- Layer 1: Perimeter Defense

- Firewalls & Intrusion Prevention Systems (IPS): Use firewalls and IPS to monitor and filter incoming traffic, detecting and blocking potentially malicious requests.

- Network Segmentation: Segment networks based on user roles and data sensitivity. Segmentation limits an attacker's movement, even if they breach one section of the network, making it harder to access sensitive data.

- Layer 2: Endpoint Security

- Endpoint Detection and Response (EDR): EDR solutions monitor endpoints for suspicious activity and can contain ransomware at an early stage. EDR tools use behavioral analytics to detect anomalous file access, encryption activity, and unauthorized changes in security settings.

- Anti-Malware and Anti-Ransomware Solutions: Modern endpoint security software includes ransomware-specific defenses, like detecting abnormal file encryption behavior and stopping the ransomware process.

- Layer 3: Access Management and Authentication

- Multi-Factor Authentication (MFA): Enforce MFA for all accounts, especially those with remote access privileges. MFA prevents attackers from gaining easy access through credential stuffing or brute-force attacks.

- Least Privilege Principle: Limit permissions to essential personnel only. Reducing the number of users with admin-level access restricts what attackers can do even if they gain access.

- Layer 4: Monitoring and Logging

- Continuous Network Monitoring: Use network traffic analysis tools to detect abnormal data flows, especially large data transfers to unusual IP addresses that could indicate exfiltration.

- Centralized Log Management (SIEM): Log all user activities, network events, and system changes. Security Information and Event Management (SIEM) systems aggregate these logs and analyze them for patterns indicating a ransomware attack or data exfiltration attempt.

- Layer 5: Data Backup and Recovery

- Regular, Offline Backups: Maintain offline, immutable backups of all critical data. Offline backups are protected from ransomware encryption, allowing businesses to restore data if necessary.

- Routine Backup Testing: Regularly test backup and recovery processes to ensure that critical data can be restored quickly, reducing downtime and recovery costs.

- Layer 6: Security Awareness Training

- Phishing Awareness: Educate employees about identifying phishing attacks, which are a primary method for initial access. Regular training and simulated phishing exercises improve user vigilance.

- Incident Response Drills: Train teams on incident response, so they're prepared to recognize early attack indicators and can act promptly to contain a breach.

3. Staying Vigilant Against Akira Ransomware IOCs

To effectively stay vigilant against Akira's Indicators of Compromise (IOCs), proactive monitoring and response are key.

- IOCs to Watch For:

- Suspicious Outbound Traffic: High volumes of outbound traffic, especially to unfamiliar IP addresses or non-standard ports, can indicate data exfiltration.

- Unusual Login Patterns: Monitor for repeated login attempts, especially from unusual IP addresses or at odd times, which could indicate credential theft.

- New or Modified File Extensions: Files appended with ".akira" or similar extensions are a clear IOC, signaling an active encryption event.

- Unauthorized Security Modifications: Changes in firewall rules or endpoint security settings may indicate an attacker's attempt to disable defenses.

- Tools and Techniques:

- Threat Intelligence Feeds: Subscribe to threat intelligence services that provide IOCs for emerging ransomware strains. Integrating this feed into your SIEM can automate IOC detection.

- Behavioral Analytics: Use behavioral analysis tools capable of learning normal network and user behaviors. When deviations are detected—such as unusual file access or data transfers—these tools can alert administrators.

- Automated Incident Response (AIR): AIR tools, often integrated within SIEM or EDR solutions, can automatically isolate affected systems, alert administrators, and even roll back changes on endpoints.

Implementing these layers with attention to Akira's tactics significantly mitigates the potential risk, ensuring that organizations have detection, containment, and recovery measures in place.

To effectively counter Akira ransomware, implementing layered defense strategies that address each phase of the ransomware lifecycle is essential. Here's how you can structure detection, containment, and recovery measures against Akira's tactics:

1. Detecting Akira Ransomware Tactics

Detection involves identifying the signs of Akira ransomware's presence before it can fully execute its objectives.

2. Perimeter Defense:

- Intrusion Detection and Prevention Systems (IDPS): Configure your firewalls and IDPS to filter incoming traffic for known Akira-related IOCs, including specific IP addresses or patterns related to data exfiltration.

3. Anomaly-Based Detection: Network monitoring systems can detect suspicious traffic patterns. For example, if there's unusual outbound traffic to unfamiliar IPs or high-volume transfers, it could signal exfiltration.

4. Endpoint Detection and Response (EDR):

- Behavioral Analytics: EDR solutions should be configured to monitor endpoints for behaviors like file encryption activities, registry changes, or sudden CPU spikes. These tools can detect early-stage ransomware activity, alerting administrators to isolate infected systems before encryption spreads.

- Threat Hunting: Conduct regular threat hunting exercises for Akira-specific IOCs. This includes scanning for ".akira" file extensions, newly created accounts, and privilege escalation attempts.

- Log Management and Analysis:

- Centralized Log Management (SIEM): Deploy a Security Information and Event Management (SIEM) system to collect logs from across your network. Set up alerts for Akira indicators, such as attempted connections to known malicious domains or unusual patterns in login attempts.

2. Containment Measures to Stop the Spread of Akira Ransomware

If detection systems indicate Akira ransomware activity, immediate containment is critical to prevent further spread.

5. Network Segmentation and Isolation:

- Quarantine Infected Systems: Implement automated responses in your EDR or SIEM that can isolate compromised machines. Network segmentation helps confine ransomware to one part of the network, limiting lateral movement.

- Disable RDP Access: If Akira uses RDP as its entry point, disable RDP access to critical systems or restrict access only to essential users with strong multi-factor authentication (MFA).

- Privilege Management:

- Least Privilege Access (LPA): Reducing access to only necessary users limits the ransomware's ability to escalate privileges across the network. Enforcing LPA policies also reduces the scope of data that could be encrypted or exfiltrated.

- User Behavior Analytics (UBA): Monitor user actions for deviations, such as attempting to access unauthorized resources. Anomalous behavior by users or compromised accounts can help identify Akira's lateral movement early.

- Blocking Exfiltration Tools:

- Application Whitelisting: Prevent the use of unapproved data exfiltration tools like Rclone or cloud storage applications. Whitelisting limits the tools attackers can use, even if they gain access to the system.

- Data Loss Prevention (DLP): Implement DLP solutions to detect unauthorized data transfer attempts. DLP tools can flag or block exfiltration attempts to untrusted external sites.

3. Recovery Strategies Post-Attack

A quick and thorough recovery process is essential to mitigate downtime and financial loss if Akira ransomware does manage to infect the network.

- Offline, Immutable Backups:

- Regular, Tested Backups: Store backups offline to prevent ransomware from infecting them. Regularly test backups to ensure they can be restored quickly, focusing on critical systems and data.

- Immutable Storage: Use storage that prevents modifications to backed-up data, which ransomware cannot alter. Immutable backups are essential for ensuring data integrity even in the face of encryption attempts.

- Disaster Recovery (DR) Planning:

- Predefined Recovery Plans: Develop a comprehensive DR plan specifically for ransomware incidents. This should include a step-by-step process for restoring data and systems and clear roles for each team member.

- Quick Response Playbooks: Create playbooks to streamline the recovery process, covering immediate steps for containment, systems isolation, and prioritized recovery.

- Communication and Transparency:

- Stakeholder Communication: Inform internal stakeholders, customers, and relevant authorities about the incident promptly. Transparency is critical for maintaining trust and staying compliant with legal obligations, especially if data exfiltration occurred.

- Coordination with Law Enforcement: In the event of a significant breach, it may be beneficial to work with law enforcement agencies, as they may provide support in tracking down the attackers or managing ransom demands.

4. Implementing and Regularly Updating Security Protocols

To ensure these strategies are effective against evolving threats like Akira, security protocols should be continuously tested and updated.

- Security Awareness Training: Conduct regular employee training focused on recognizing phishing attempts, a primary initial access method for ransomware.

- Patch Management: Routinely update software and systems, focusing on patching vulnerabilities in applications that are frequently exploited by ransomware, such as RDP and email clients.

- Continuous Improvement with Lessons Learned: After an incident, conduct a thorough post-mortem analysis. Document lessons learned and adjust policies, protocols, and defenses accordingly to avoid similar vulnerabilities in the future.

Implementing these layered defenses with a focus on Akira's specific attack vectors—like data exfiltration, lateral movement, and double extortion—can reduce the risk and impact of a ransomware attack. A proactive approach to ransomware defense, detection, containment, and recovery strengthens organizational resilience against ransomware groups like Akira.

This article format provides a detailed analysis of Akira ransomware with an emphasis on detection, containment, and recovery tactics.

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AKIRA
RANSOMWARE
INFECTS SYSTEMS
Spreads through phishing emails, exploits, and other methods
ENCRYPTS FILES
Encrypts documents, images, and other data on the system
DEMANDS PAYMENT
Requires a ransom payment for file decryption